

## ABSTRACT

*In a world that continues to grow rapidly, technological developments present new challenges, especially in terms of signal detection and control. The presence of unauthorized foreign signals, especially at radio frequencies, poses a serious threat to the stability of communications, especially in the field of aviation, radio frequency signal interference can threaten and endanger communications. For example, effective communication between air traffic controllers and pilots is essential. However, overlapping frequencies and illegal radio signals can disrupt such communication and threaten flight safety. The required solution must be fast, effective and efficient. Of course, Software Defined Radio (SDR) technology allows us to adaptively adjust frequencies and detect the direction of incoming signals more effectively. This update not only helps maintain the stability of communication services, but also provides a better understanding of the electromagnetic environment in the region.*

*Signal direction detection and frequency monitoring system using RTL-SDR is made as a solution in optimizing the frequency. This tool aims to make it easier to monitor the frequency and know the direction of the signal, also useful for monitoring illegal signal violations. In the Signal Direction Detection and Frequency Monitoring system using RTL-SDR, the SDR used is GNU Radio software. Signal search is done by looking for the largest power captured by the receiving antenna.*

*In testing the direction of signal detection and frequency monitoring system using RTL-SDR, 3 test methods were carried out with a frequency of 145.525 MHz. The test was carried out using a dipole antenna with 3 antenna tilt methods, namely 90 °, 135 °, and 180 °. From these tests, the dipole antenna with a 135 ° tilt has accuracy with a value of  $Pd$  (Probability of Detection) of 0.875 and  $Pfa$  (Probability Off False Alarm) of 0.125. With these values, the method used can determine the direction of incoming signals.*

**keywords: RTL-SDR, GNU Radio, Dipole Antenna,  $Pd$ ,  $Pfa$ .**